

**WHAT IS CLAIMED IS:**

1. An optimal high-speed multi-resolution retrieval method on a large capacity database comprising the steps of:

5 deriving the multi-resolution structure of a query "Q";

setting an initial minimum distance " $d_{\min}$ " to have the infinite value.

setting respective values of "i" and "l" to be "1".

deriving " $d^l(X_i, Q)$ ";

deriving " $d^L(X_1, Q)$ "; and

selecting data having a final value of " $d_{\min}$ " as the best match.

2. The optimal high-speed multi-resolution retrieval method according to claim 1, wherein the step of deriving " $d^l(X_i, Q)$ " comprises the steps of:

if " $d^l(X_1, Q)$ " is more than " $d_{\min}$ ", then removing the current candidate " $X_1$ ", and updating respective values of "i" and "l" with "i + 1" and "l"; and

20 if " $d^l(X_i, Q)$ " is not more than " $d_{\min}$ ", then updating "l" with "i + 1".

3. The optimal high-speed multi-resolution retrieval method according to claim 1, wherein the step of deriving " $d^L(X_i, Q)$ " comprises the steps of:

if " $d^L(X_i, Q)$ " is more than " $d_{min}$ ", then removing the current candidate " $X_i$ "; and

if " $d^L(X_i, Q)$ " is not more than " $d_{min}$ ", then updating " $d_{min}$ " with " $d^L(X_i, Q)$ ", and updating respective values of " $i$ " and " $l$ " with " $i + 1$ " and " $l$ ".

4. The optimal high-speed multi-resolution retrieval method according to claim 1, wherein the high-speed multi-resolution retrieval on the database is carried out using an inequality property expressed by the following expression:

$$d(X,Y) \equiv d^L(X,Y) \geq d^{L-1}(X,Y) \geq \dots \geq d^l(X,Y) \geq \dots \geq d^1(X,Y) \geq d^0(X,Y)$$

5. An optimal high-speed multi-resolution retrieval method using a cluster-based multi-resolution search algorithm adapted to output one best match, comprising the steps of:

performing a high-speed multi-resolution exhaustive search algorithm, thereby searching for a cluster " $k_{min}$ " having a minimum distance " $d'_{min}$ ";

setting an initial value of the " $d_{min}$ " to " $d'_{min}$ ", applying the high-speed multi-resolution exhaustive search algorithm to " $\Phi_{k_{min}}$ ", thereby updating " $d_{min}$ ";

deriving " $d^k(C_k, Q) - \delta_k$ "; and

selecting data having a final value of " $d_{min}$ " is selected as the best match.

6. The optimal high-speed multi-resolution retrieval method according to claim 5, wherein the high-speed multi-resolution retrieval using the cluster-based multi-resolution search algorithm is carried out using an inequality property expressed by the following expression:

If  $d^{l_k}(C_k, Q) - \delta_k > d_{\min}$ , then  $X_i \in \Phi_k^{\min} d(X_i, Q) > d_{\min}$

where,  $l_k \leq L$

7. The optimal high-speed multi-resolution retrieval method according to claim 5, wherein "d<sub>min</sub>" is updated with a value expressed by the following expression:

$d_{\min} = X_i \in \Phi_{k_{\min}}^{\min} d^{l_k}(X_i, Q)$ ,

further comprising the steps of:

setting "k" to "1"; and

if  $k = k_{\min}$ , updating "k" with "k + 1".

8. The optimal high-speed multi-resolution retrieval method according to claim 5 or 6, further comprising:

if " $d^{l_k}(C_k, Q) - \delta_k$ " is more than "d<sub>min</sub>", removing the cluster "k";

if " $d^k(C_k, Q) - \delta_k$ " is not more than " $d_{\min}$ ", applying the high-speed multi-resolution exhaustive search algorithm to " $\Phi_k$ ", thereby updating " $d_{\min}$ "; and updating " $k$ " with " $k + 1$ ".

5

9. An optimal high-speed multi-resolution retrieval method using a cluster-based multi-resolution search algorithm adapted to output a plurality of more-significant best matches, comprising the steps of:

performing a high-speed multi-resolution exhaustive search algorithm, thereby searching for a cluster " $k_{\min}$ " having a minimum distance " $d'_{\min}$ ";

if  $n(\Phi_{k_{\min}}) \geq M$ , searching for  $M$  more-significant best matches in accordance with an algorithm modified from the high-speed multi-resolution exhaustive search algorithm to search for the  $M$  more-significant best matches, and storing respective distance values of the searched more-significant best matches " $d_{\min}[\cdot]$ ";

setting " $k$ " to " $1$ ", and if  $k = k_{\min}$ , updating " $k$ " with " $k + 1$ ";

if  $d^k(C_k, Q) - \delta_k > d_{\min}[0]$ , removing the cluster " $k$ ", and updating " $k$ " with " $k + 1$ ";

updating " $d_{\min}[\cdot]$ " while applying the modified high-speed multi-resolution exhaustive search algorithm to " $\Phi_k$ ", and updating " $k$ " with " $k + 1$ ";

setting "k" to "1", and if it is determined that the cluster "k" has been searched for, updating "k" with "k + 1";

if  $d^{l_k}(C_k, Q) - \delta_k > d_{\min}[M - 1]$ , removing the cluster "k", and updating "k" with "k + 1";

5 updating " $d_{\min}[\cdot]$ " while applying the modified high-speed multi-resolution exhaustive search algorithm to " $\Phi_k$ ", and updating "k" with "k + 1"; and

selecting M data corresponding to a final " $d_{\min}[\cdot]$ " as best matches, respectively.

10. The optimal high-speed multi-resolution retrieval method according to claim 9, wherein the high-speed multi-resolution retrieval using the cluster-based multi-resolution search algorithm is carried out using an inequality property expressed by the following expression:

$$\text{If } d(C_k, Q) - \delta_k > d_{\min}[M - 1], \text{ then } X_i \in \Phi_k^{\min} d(X_i, Q) > d_{\min}[M - 1]$$

11. The optimal high-speed multi-resolution retrieval method according to claim 9, further comprising:

if  $n(\Phi_{k_{\min}}) < M$ , filling  $n(\Phi_{k_{\min}})$  distance values in " $d_{\min}[\cdot]$ " in the order of higher values, starting from the lowest value, and storing the remaining elements of " $d_{\min}[\cdot]$ " with the infinite value.